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Crop Yield Prospects for 1962

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THIS PAST fall Iowa farmers harvested the highest state average corn and soybean yields on record. What factors were responsible for these high yields? Will we have them again in 1962?

It's true that fertilizers, insecticides, herbicides, improved equipment, superior hybrids and varieties, timeliness of operations and greater farming "know-how" were important factors. But, *weather* —particularly rainfall—often is the deciding factor that allows good farming and good soil to be expressed in high yields. Next year's weather may not be as favorable—and it's the variation of the weather that causes much of the year-to-year variation in yield.

What influence will weather have on crop yields in 1962? Unfortunately, we don't yet know what the weather will be like in 1962. But our research helps us tell you what can happen if different kinds of weather do occur. What we say in this article will be directed primarily toward corn, but the information applies generally to all full-season crops. We'll point out what we think are the most important weather factors affecting crop yields, how these factors were important in 1961 and how they're expected to be important in 1962. The effect of weather on crop yields is largely the result of the interaction of soil moisture, rainfall and temperature.

Moisture: Moisture is the most important factor which affects crop yields. We must have an adequate supply of moisture if yields are to be high. The moisture used to produce a crop may come from adequate and well-distributed rainfall, or some of it may come from soil moisture that accumulated from previous rainfall.

Winter precipitation is low and usually has little effect on soil moisture. Fall precipitation is included in the soil moisture values we'll use. So, for the moment, we'll consider only warm-season precipitation—April through September. To estimate what effect precipitation will have on yields, we've divided it into three seasonal types—dry, average, wet. In the past, each of these has occurred about a third of the time.

For the April-September period, a *dry* season will have 18-20 inches or less of rainfall—with the lesser amount in the northwest and the greater amount in south-central and southeastern Iowa. If there are more than 22 inches in the northwest, ranging up to more than 26 inches in south-central Iowa, we call it a *wet* season. If the rainfall is between 18-22 inches in the northwest to 20-26 inches in the south-central and southeast, the seasonal rainfall is *average*. These figures are for total rainfall and do not consider its distribution.

We divided the soil moisture reserve into three categories—low, medium, high. Our research shows that 22-24 inches of water are needed during the April-September period to produce above-average corn yields. This can come from precipitation, soil moisture reserves or both. If the distribution of rainfall is poor, it may take more; if favorable, less.

Most silt loam soils in Iowa will hold about 2 inches of plant-available moisture in each foot of the soil profile. Sandy soils may hold less than one-half inch, and silty clays and clay loams will hold a little less than 2 inches per profile foot. Corn will remove moisture to a depth of 5 feet (7 feet under favorable conditions), so we measure soil moisture to a depth of 5 feet.

In areas with low plant-available moisture (less than 5 inches in the top 5 feet), most of the water must come from warm-season rainfall. This calls for above-normal rainfall to get above-average yields. With medium soil moisture (5-8 inches), high yields can be expected unless rainfall is below normal. With high soil moisture (8 inches or more), there should be plenty of water except in dry seasons; in wet years, there may be too much.

A wet year may occur when a wet, cool spring follows a wet fall. When soil moisture is low, high spring rainfall seldom creates problems, and it may be very helpful. High spring rainfall usually does create problems when soil moisture is medium to high. Areas with low soil moisture have more potential to store rainfall and may not be hurt as much by high spring rainfall. Areas with high soil moisture have little space to

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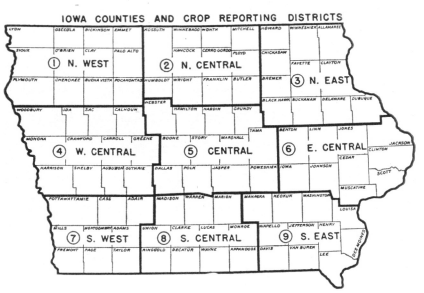
store rainfall, so serious problems can arise from excess water—particularly in some of the tighter soils in southeast and south-central Iowa. Ponding may occur in north-central Iowa when soil moisture is high and rainfall heavy.

A plant must have a good moisture supply during the tasseling-silking period. Drouth stress during this period is twice as serious as similar stress before tasseling or a week or more after pollination. If temperatures are high, or the air is very dry, the demand for water by the atmosphere may be greater than the plant can supply unless soil moisture is near field capacity. Plants may wilt if the moisture supply is low. Whenever a plant wilts, its yield is being reduced. However, plants may be hurt before they wilt. If the top leaves look grayish-green during the middle of a hot day, but aren't actually wilted, they're probably under moisture stress, and yield is being reduced.

After silking, corn needs clear weather, plenty of moisture and temperatures between 75° and 85°. The effect of higher temperatures depends on the moisture supply, but temperatures over 90° usually are harmful.



Last Year: Before considering 1962, let's see what happened in 1961. Last year's weather will be hard to beat. In November 1960, most of the state had a high soil moisture reserve, except for an area in the northwest where the reserve was low.

Heavy rains occurred in March and April over most of the state. The mid-April soil samples showed that all parts of the state were in the medium-to-high soil moisture category. Free water was found at 3-4 feet in some locations. Rainfall between the April and June samplings was below normal. Relatively few problems were created by the high spring moisture, except for delayed planting in northeast Iowa and other scattered areas. July precipitation was above normal, and temperatures were below normal.

Soil moisture reserves in early August generally were favorable, except in extreme west and northwest Iowa. August precipitation was below normal only in northern and central Iowa, but the rainfall generally was well timed.

In summary, the high moisture reserve in the spring, combined with relatively dry periods in May and early June got the crop off to a good start. Good rains in July, well-timed rains in August and good weather in September produced almost ideal conditions. The other weather factors cooperated well, except in scattered areas where locally heavy rains or hail damaged crops. Locally heavy rains in late October delayed corn and some bean harvesting, especially in eastern and southern Iowa.

What About 1962? In considering the prospects for the 1962 crop we must consider the soil moisture reserve and the anticipated rainfall. Each of these moisture factors has been divided into three groups. The table shows the 1962 yield level predictions for the different parts of the state.

Distribution of rainfall and temperatures will be important as the season progresses. Hot, dry weather near the tasseling-silking time could be particularly harmful.

In general, *our estimates indicate above-average yield prospects for 1962. High yields will be realized if we have weather indicated as "ideal" as the season progresses. Yields will be reduced if the "detrimental" conditions occur.*

May: "Ideal" — Slightly warmer and drier than normal where moisture reserves are adequate; near-normal rainfall where reserves are low. This will result in favorable field conditions and will get the crop off to a good start.

"Detrimental" — A wet, cool May, particularly in areas with a high soil moisture reserve, could delay planting and early crop progress. (Our heavy fall precipitation has made us particularly susceptible to this possibility.)

June: "Ideal"—Slightly warmer than normal temperatures will favor good crop progress. In dry areas, normal or above-normal rainfall to build up soil moisture. In other areas, normal to slightly below-normal rainfall.

"Detrimental" — Average June temperature for Iowa is just below 70°. If temperatures are much below this, crop progress may be slow, and the crop could be damaged by an early fall frost.

July-August: "Ideal"—Temperatures 2-3 degrees below normal and above-normal rainfall. It's very important to have adequate rainfall and no extremely high temperatures during tasseling and silking and for at least a week after pollination. Above-normal rainfall is needed if the soil moisture supply is low in early July.

"Detrimental" — High temperatures and low rainfall.

September - October: "Ideal" — A warm, dry late-September is the best weather to hasten drying. Continued warm, dry weather in early October will result in an early harvest.

"Detrimental" — A killing freeze in September or early October, particularly if the crop is late.

Yield Estimates for 1962.

November soil moisture	Areas[a]	If 1962 season, April 1-Sept. 30, is . . .	. . . then 1962 predicted yield is:
Low	NW—corn and soybeans (some areas) and most areas in meadow 1961	Dry	Much below normal
		Average	Below normal
		Wet	Normal
Medium	NW—corn and soybeans (some areas) NC—meadow (some areas) WC—meadow	Dry	Below to normal
		Average	Above normal
		Wet	Above normal
High	NC—meadow (some areas) WC—corn, soybeans NE, EC, C, SW, SC, SE—all crops	Dry	Below to normal
		Average	Above normal
		Wet	Normal to below normal

[a]Crop reporting districts, see map above.